

NTSB National Transportation Safety Board



NTSB Safety Seminar Ashburn Training Center May 10, 2014

Loss of Control Safety Seminar

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N6529R - B36TC Bonanza



NTSB Mission

The NTSB is an independent US federal agency charged with determining the probable cause(s) of transportation accidents, making recommendations to prevent their recurrence, conducting special studies and investigations, and coordinating resources to assist victims and their families after an accident.



Topics

- General Aviation Accident Trends
- Most Wanted List
- GA Community Activities JSC
- NTSB Safety Alerts

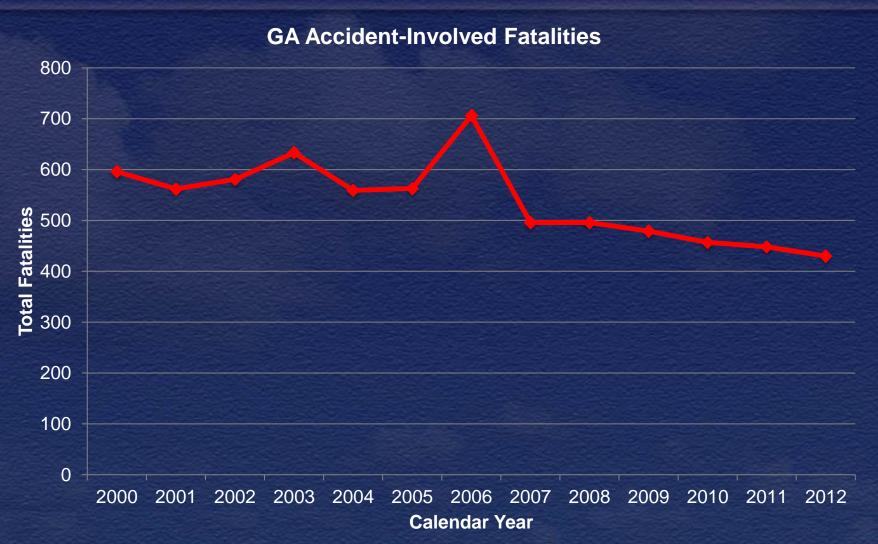


All GA Accidents



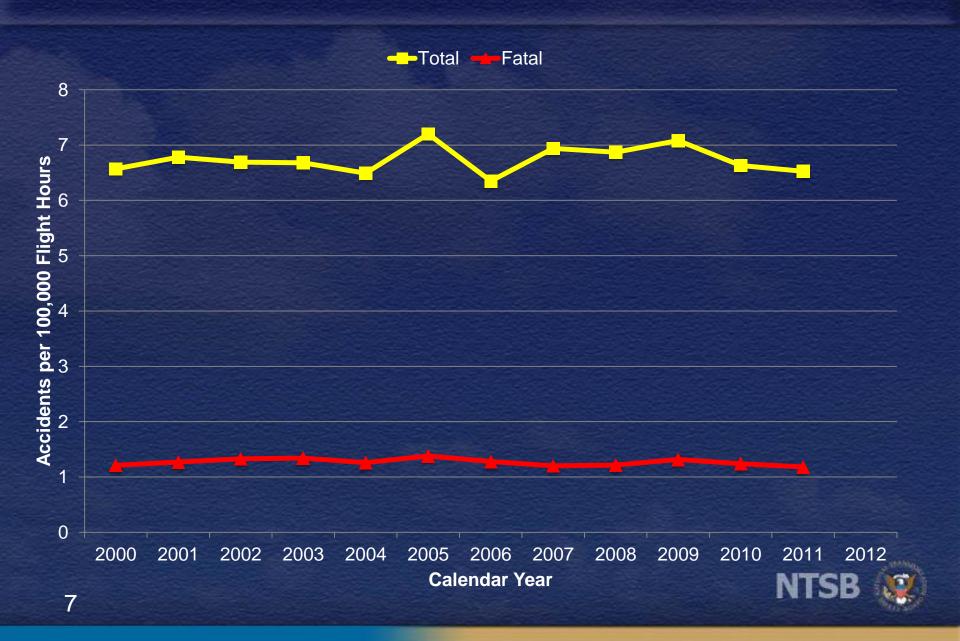


GA Accident-involved Fatalities





GA Accident Rates



Defining Fatal Accident Events All GA 2008-2012

- Loss of Control in Flight
- System/Component Failure Powerplant
- Controlled Flight into Terrain
- Collision with Terrain/Object (non-CFIT)
- VFR Encounter with IMC
- System/Component Failure –
 Non-Powerplant



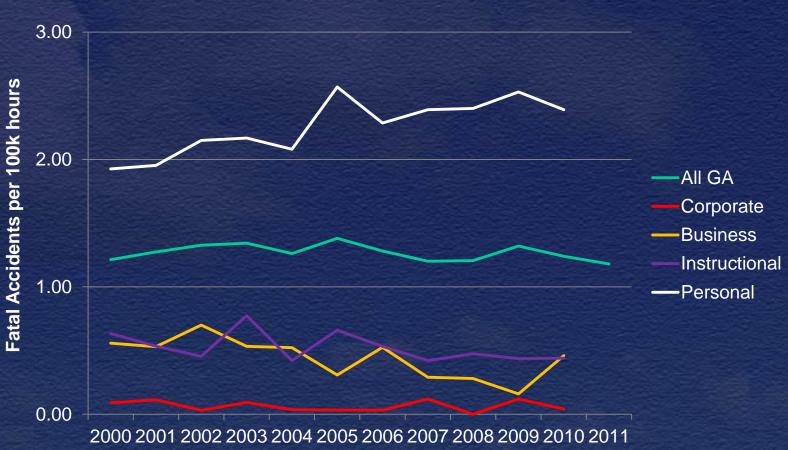
Accident Rates per 100k Flight Hours





Fatal Accident Rates per 100k Flight Hours







Topics

- General Aviation Accident Trends
- Most Wanted List
- GA Community Activities JSC
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NTSB Most Wanted List



- General Aviation: Identify and Communicate Hazardous Weather
- Address Unique Characteristics of Helicopter Operations
- Advance Passenger Vessel Safety
- Eliminate Distraction in Transportation
- Eliminate Substance-Impaired Driving
- Enhance Pipeline Safety
- Improve Fire Safety in Transportation
- Implement Positive Train Control Systems
- Promote Operational Safety in Rail Mass Transit
- Strengthen Occupant Protection in Transportation



Why GA on the Most Wanted List?

- NTSB investigates approximately 1500 GA accidents per year
- Overall GA accident rate flat
 - Has not improved over the last decade
 - Airline accident rate decreased more than 80%
- Personal flying accident rate
 - Increased 20% over last 10 years
 - Fatal rate increased 25% over that period
 - GA safety needs attention



GA – 2014 Most Wanted List Item

Identify and communicate hazardous weather

- Focus areas
 - Creation of weather information and advisories
 - Collection and dissemination of weather information
 - Pilot training and operations



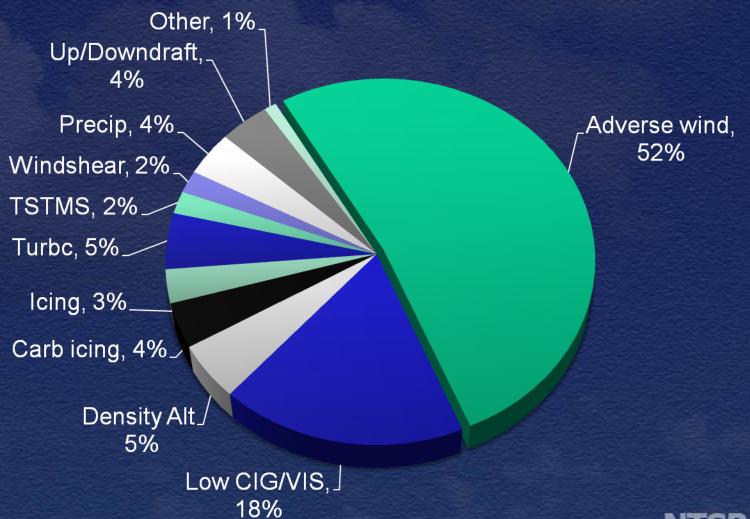
Why focus on weather?

Weather continues to play a major role in accidents and incidents

Most accidents and incidents in weather are preventable

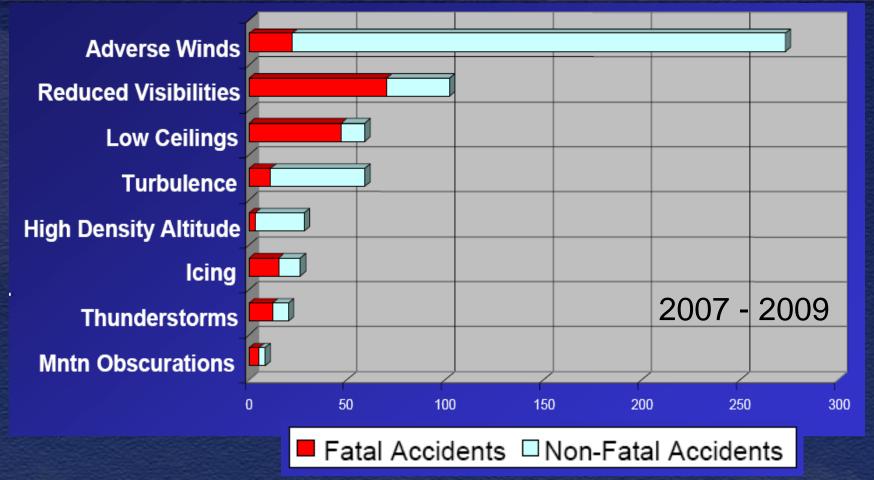


Part 91 Weather Related Accidents 2007-2009





Weather Related Accidents



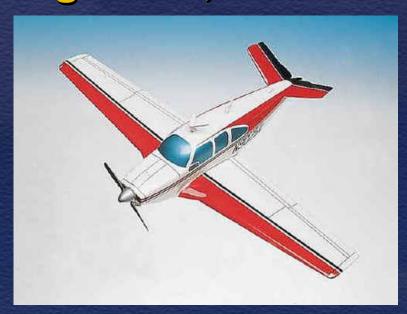
Weather related accident categories can have high fatality rates!

Areas of Concern

- The overall ATC/pilot/met culture
- Wx training for ATC and pilots
- NWS consistency in aviation information/products
- PIREPs

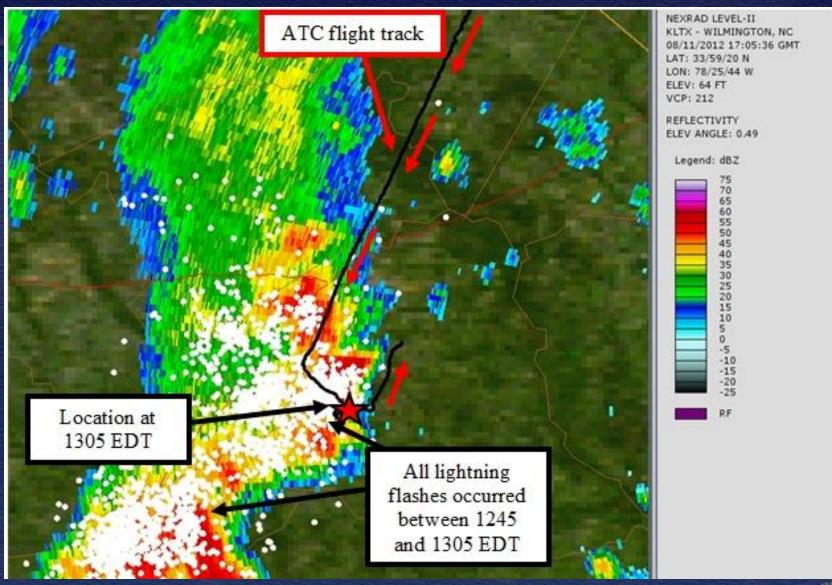


ERA12LA500 Beech V35B, N11JK Effingham, SC August 11, 2012



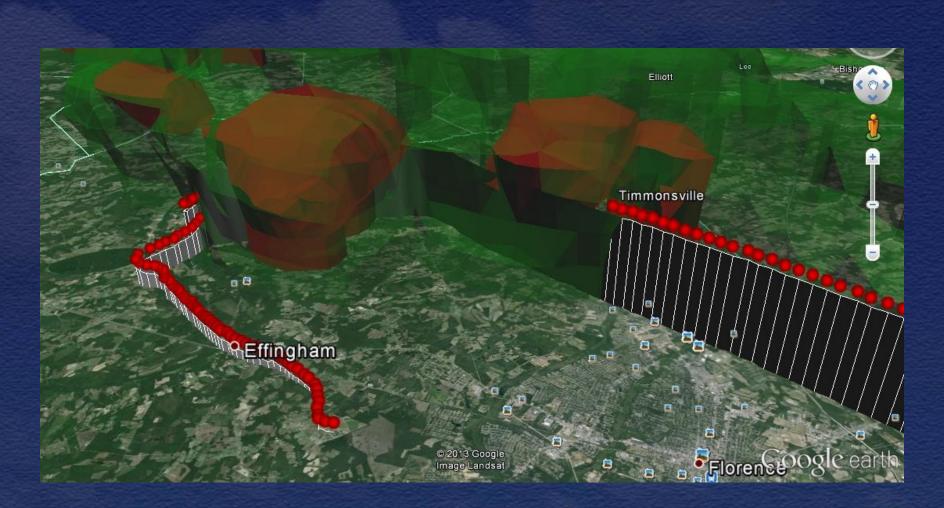
- IFR flight
- Weather briefing obtained/ flight plan filed
- Non-fatal

KFLO 111730Z 22008G25KT 1 3/4SM +RA BR FEW033 BKN049 22/20 A2997 RMK AO2 PK WND 26033/1714 RAB14 P0008=

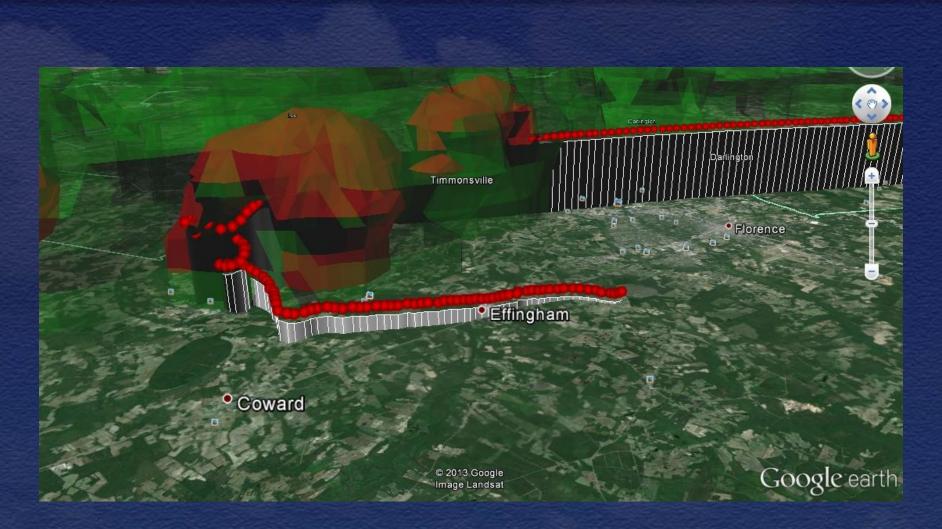














CEN12FA108 Piper PA-32-260, N3590T Near Bryan, TX December 19, 2011



- IFR flight
- Weather briefing unknown
- Five fatalities



Main Wreckage, Forward View





Main Wreckage, Left Side View







Main Wreckage, Right Side View



Left Wing



CEN12FA108



Bryan Texas Accident (CEN12FA108)

History of Flight

- December 11, 2011
- Cross country flight with four passengers
 - Jackson, MS to Waco, TX
- Level cruise at 8,000 ft.
- Pilot informed ATC he was diverting around an area of thunderstorms
- Last reported he was in "bad" weather and was going to try to get out of it.
- Radio and radar contact lost
- Pilot and four passenger fatalities



- Wreckage
 - Main wreckage consisted of airplane except for
 - Left wing, vertical stabilizer, rudder, and right wing tip fuel tank
 - Wreckage spread over path a half mile long and 200 ft. wide
 - Left wing spar showed wing failed in positive overload



- Aircraft
 - Piper PA-32-260 (Cherokee Six)
 - 6,125 hrs. on airframe
 - Postcrash examination
 - no preimpact anomalies of engine or systems
- Pilot
 - Private, SEL, Instrument rating
 - Total time 392 hrs.
 - 14 hrs. actual instruments



- Weather conditions SIGMET
 - Potential for
 - heavy rain showers,
 - thunderstorms,
 - wind in excess of 45 knots,
 - clear air turbulence,
 - low-level wind shear
 - Pilot relying on Garmin 696 with XM
 NEXRAD weather



- NEXRAD data likely showed pilot clear of precipitation
- Near end of flight, flew into rapidly developing rain shower
- Last three updates were at least 6,
 7, and 8 minutes old when displayed

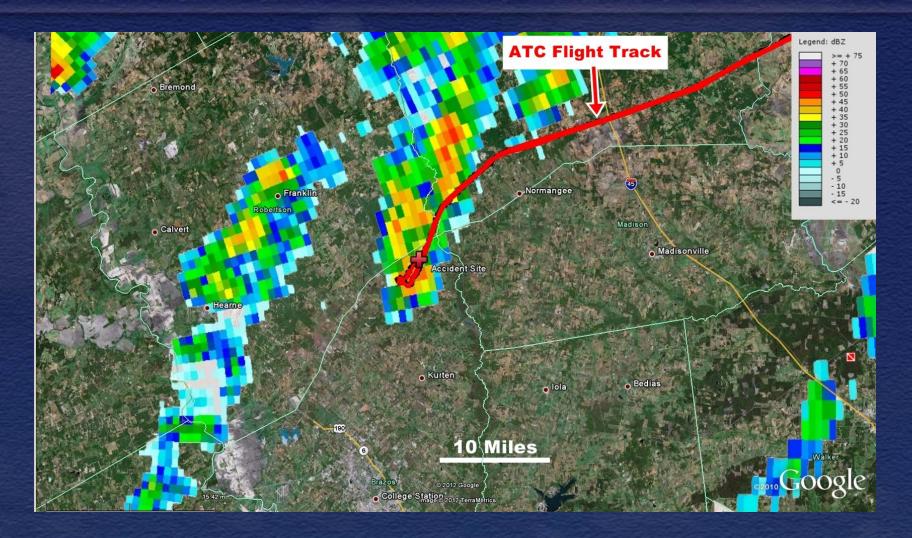


Pilot's On-Board Weather Image





Actual Flight Path





- NEXRAD displayed age indicator time of mosaic image compilation/creation
- Not all components of mosaic updated
- NEXRAD data can age significantly by the time image is created
- Oldest data can exceed age indication by 15 to 20 minutes in extreme cases

NEXRAD mosaic shows where weather WAS, not where it IS



SA - In-Cockpit NEXRAD Imagery





In-Cockpit NEXRAD Mosaic Imagery

Actual Age of NEXRAD Data Can Differ Significantly From Age Indicated on Display

- Weather radar "mosaic" imagery created from Next Generation Radar (NEXRAD) viveather radar musaic imagery created norm Next Generation radar (NEARAD) data is available to pilots in the cockpit via the flight information service-broadcast The problem (FIS-B) and private satellite weather service providers.
 - A mosaic image presents radar data from multiple radar ground sites on a single image on the cockpit display. When a mosaic image is updated, it may not contain
 - The age indicator associated with the mosaic image on the cockpit display does not the age indicator associated with the mosaic image on the cockpit display goes not show the age of the actual weather conditions as detected by the NEXRAD network. only the age of the actual weather containers as detected by the NEARAU network. instead, the age indicator displays the age of the mosaic image created by the service provider. Weather conditions depicted on the mosaic image will ALWAYS be older than the age indicated on the display.
 - Due to latencies inherent in processes used to detect and deliver the NEXRAD data from the ground site to the service provider, as well as the time intervals used for the month the ground site to the service provider, as well as the time little time little trace for the mosaic-creation process set by the service provider, NEXRAD data can age significantly by the time the mosaic image is created.
 - Although such situations are not believed to be typical, in extreme latency and Authority such situations are not believed to be typical, in extreme latency and mosaic-creation scenarios, the actual age of the oldest NEXRAD data in the mosaic mosaic research the age indicated in the mosaic mosaic research. can EXCEED the age indication in the cockpit by

15 to 20 minutes.1

 Even small time differences between the age indicator and actual conditions can be Even small unite differences between the age minitation and additional continuous carried important for safety of flight, especially when considering fast-moving weather important and additional control of the contro important for safety of hight, especially when considering last-moving hazards, quickly developing weather scenarios, and/or fast-moving aircraft.

"...the actual age of the oldest NEXRAD data in the mosaic can EXCEED the age indication in the cockpit by 15 to 20 minutes."

> Available on www.ntsb.gov



³ Actual maximum age differences can vary between service type (FIS-B versus satellite) and provider.

Pilot Reports - PIREPS

- PIREPs are a critical source of aviation weather information
- PIREPs allow ATC and meteorologists to keep all pilots aware of weather hazards
- ALL PIREPs (including "null" and "light" reports) are operationally significant to an aviation meteorologist!
- PIREPs can communicate better flying conditions, help reduce AIRMET size, and prevent weather advisories from "crying wolf"
- PIREPs can help warn pilots of conditions that may be worse than forecasted



Q

PIREPs assist with...

- AIRMETs
- SIGMETs
- CWAs
- TAFs
- Area Forecasts
- Computer models (turbulence forecasts, icing forecasts, etc...)
- Products developed by meteorologists and provided to ATC
- EVERYONE's situation awareness of weather



NTSB interests

- Hazardous Weather Identification and Communication in General Aviation – NTSB Most Wanted List item
- NTSB recognizes importance of improving the PIREP "system" in NAS

Pilots – increase volume of PIREPs and ensure reporting is accurate and detailed

FAA – major changes to the way PIREPs are handled, ensuring more timely and accurate weather related information is received by the pilot

NWS – consistent weighting of reports by meteorologists, so the best products are delivered to the flying community

NTSB formally working with AOPA, FAA and NWS



What should pilots do?

- Understand that YOUR reports provide the BEST situational information on aviation weather for other pilots, ATC, and meteorologists
- Give detailed PIREP's, especially when reporting hazardous weather conditions, to ATC or Flight Watch
- Report weather that <u>does</u> vary greatly from what is forecast
- Report weather that <u>does not</u> vary greatly from what is forecast
- Provide routine reports even if it's severe clear and no turbulence



What should pilots do?

- To ensure your report gets to those who need it, begin communication with "I want to make a <u>PIREP</u>"
- Report icing and turbulence encounters in accordance with FAA criteria:
 - Icing (sections 7-1-21 and 7-1-22 in AIM)
 - Turbulence (section 7-1-23 in AIM)

AOPA PIREP resource:

http://flash.aopa.org/asf/skyspotter/swf/flash.cfm



Summary

- Identifying and Communicating
 Hazardous Weather Most Wanted List
- Multi-year/on going effort
- Most weather related accidents and incidents are preventable



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GA Joint Steering Committee

Adapt the successful CAST model

- Cooperative Government and Industry
- Data driven risk management
- Consensus decision-making
- Voluntary commitment
- Implementation focused

The GAJSC is a means to...

 Focus limited Government/Industry resources to data-driven risks and solutions

GA JSC Organization

- Steering Committee
 - Co-chaired by FAA and AOPA
- Safety Analysis Team
 - Co-chaired by FAA and GAMA
- Working Group(s)
 - Composed of subject matter experts as appropriate and relevant to topic



GA JSC Participants

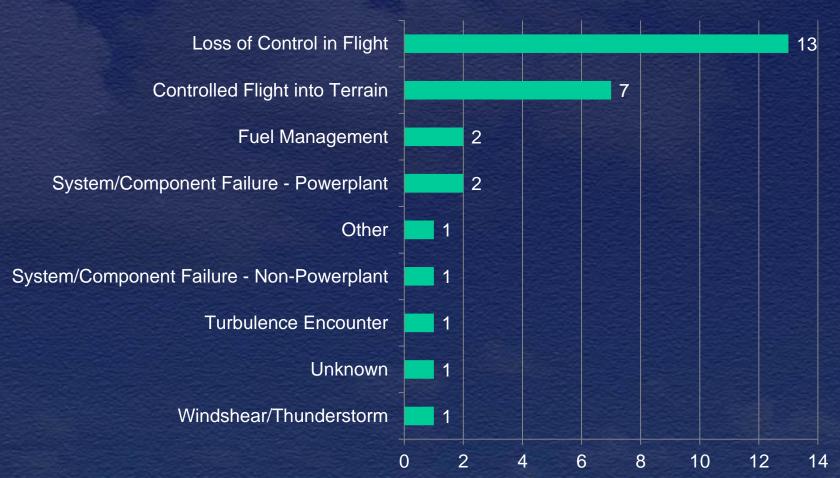
- Government
 - FAA, NASA, NTSB, NWS

- Industry/Operational Community
 - GAMA, EAA, NBAA, NATA, AOPA, SAFE, NAFI, FSF, UAA, Pegasus, SAMA, Insurance, Academia...



Business Flying, 2008-2012

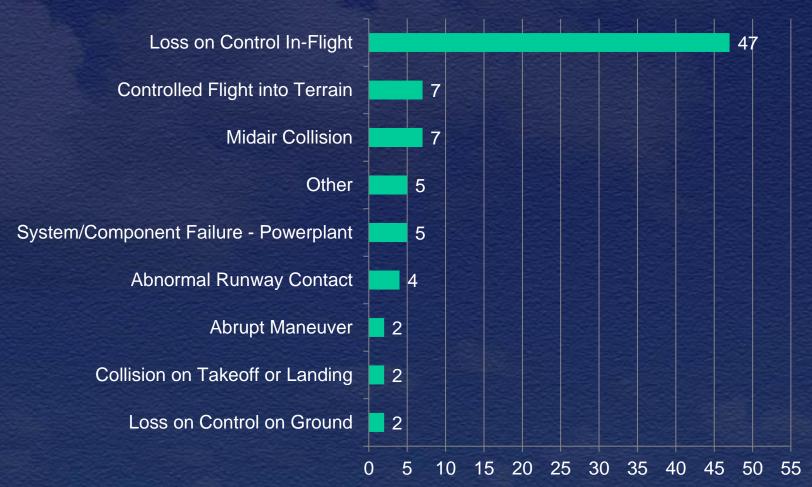
Number of Fatal Accidents





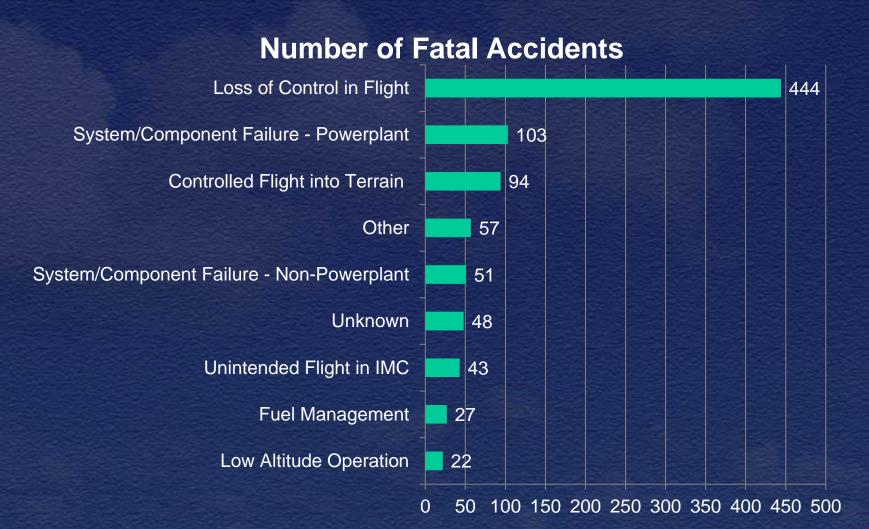
Instructional Flying, 2008-2012

Number of Fatal Accidents





Personal Flying, 2008-2012

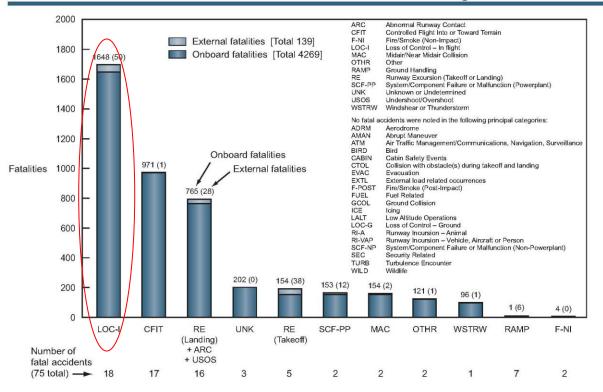




Boeing Annual Statistical Summery

Fatalities by CAST/ICAO Common Taxonomy Team (CICTT) Aviation Occurrence Categories

Fatal Accidents - Worldwide Commercial Jet Fleet - 2003 Through 2012



Note: Principal categories as assigned by CAST.

For a complete description of CICTT Aviation Occurrence Categories, go to: http://www.intlaviationstandards.org/





Primary category of accidents

Personal flying
Instructional flying
Business flying
Airline flying

- LOC

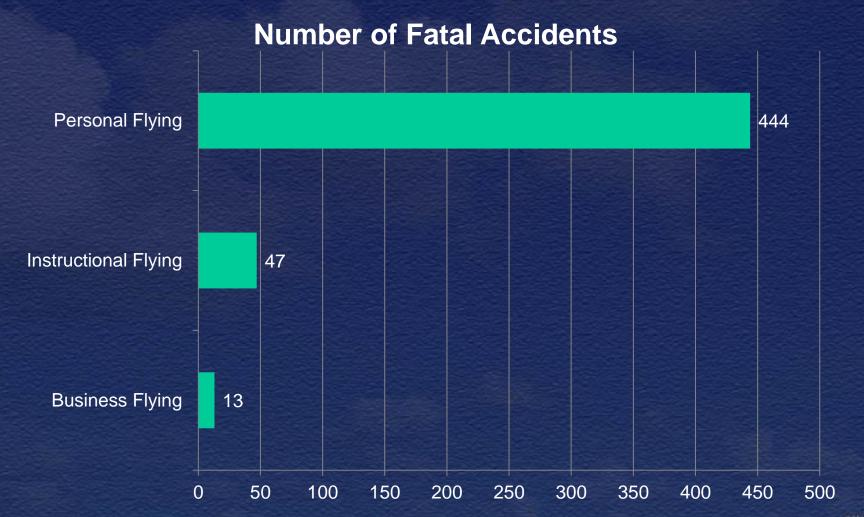
- LOC

- LOC

- LOC

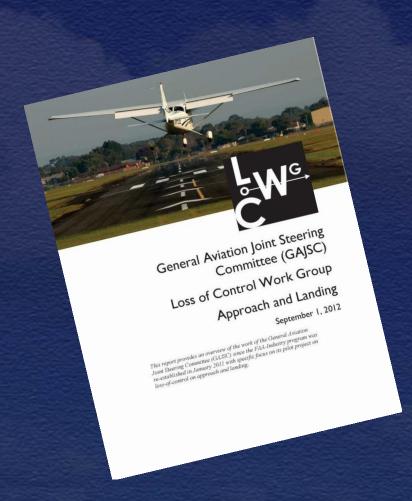


Loss-of-Control 2008-2012





Loss-of-control Working Group



Safety Enhancements Identified

- AOA New, Current, Retrofit
- Aeronautical Decision Making
- Stabilized Approach
- Single Pilot CRM
- Medication effects
- Weather Technologies
- Etc...

28 Safety Enhancements



Lower Cost AOA Displays

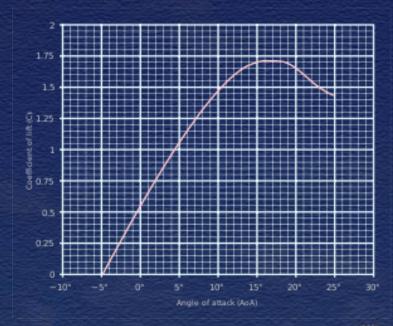
- Stall occurs at a specific Angle-of-Attack
 - But not always at the same airspeed





First of AOA indicators built to ASTM stds and installed as a minor mod

FAA installation policy changed





Stall Recovery

- Reduce the angle-of-attack below maximum lift coefficient
 - Push over to eliminate stall warning
- Level wings
- Adjust throttle
 - Avoid overspeed and high G levels
- Pitch back to level
- Don't try to "Power out of a stall"



FDM Benefits to the GA Community

- Flight replay capability of flights brought into the program
- Comparison of self with the greater GA community
- Identification of potential risks discovered in their own flight data
- Systemic Improvements in GA safety



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NTSB Safety Alerts



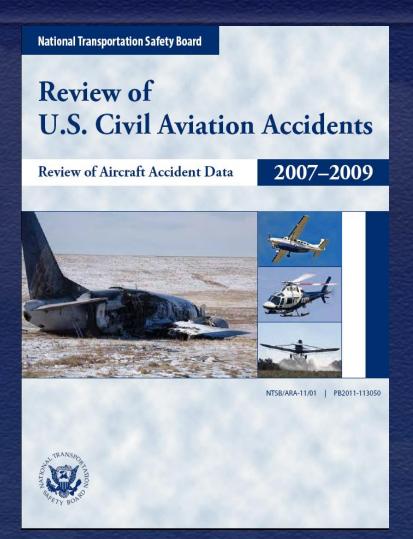
- Preventing Aerodynamic Stalls
- > Reduced Visual References
- > Is Your Aircraft Talking to You
- Risk Management for Pilots
- Risk Management for Mechanics



Safety Alert Video Preview



Accident Investigations



- NTSB accident files are on-line
- Many recent accident Dockets are on-line
 - Factual reports,
 - Interviews
 - Photographs
- www.ntsb.gov



Alfred Sheinwold

"Learn all you can from the mistakes of others. You won't have time to make them all yourself"



Douglas Adams

"Human beings, who are almost unique in having ability to learn from the experience of others, are also remarkable for their apparent disinclination to do so."





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